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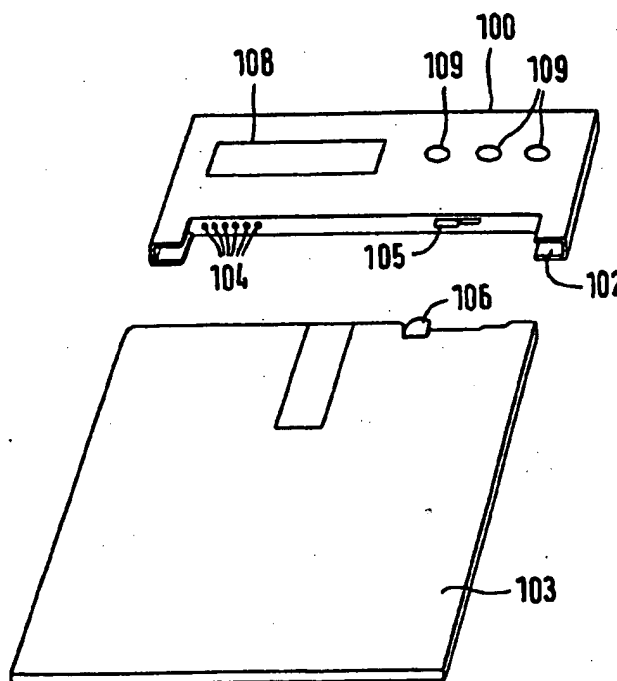
## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(21) International Application Number: PCT/EP95/03745 (22) International Filing Date: 22 September 1995 (22.09.95) (30) Priority Data: 08/514,382 11 August 1995 (11.08.95) US (71) Applicant: SMARTDISKETTE GMBH [DE/DE]; Ferdinand-Abt-Strasse 1, D-65510 Idstein (DE). (72) Inventors: BARRETT, Paul; Mayfield, Old Malden Lane, Worcester Park, Surrey KT4 7PU (GB). EISELE, Raymund; Ferdinand-Abt-Strasse 1, D-65510 Idstein (DE). (74) Agent: LEINWEBER, Jürgen; Aggerstrasse 24, D-50859 Köln (DE).		(81) Designated States: AU, CA, JP, NO, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).  Published With international search report.

(54) Title: POCKET INTERFACE UNIT (PIU) FOR A SMART DISKETTE

## (57) Abstract

A pocket interface unit for a smart diskette. The smart diskette has a housing of the shape and size of a standard diskette, electrical contacts and/or a magnetic transducer, an activation switch, and further has an interface, a processor and memory disposed in the housing and operatively coupled to the electrical contacts/magnetic transducer. The interface unit includes a frame adapted to removably attach to the smart diskette housing, electrical contacts and/or magnetic transducer for engaging corresponding electrical contacts and/or magnetic transducer on the smart diskette, a switch operating mechanism for operating an activation switch on the smart diskette when the smart diskette is attached to the frame, a display operatively coupled to the electrical contacts and/or magnetic transducer, for displaying text and/or graphical data under control of the smart diskette, and a plurality of user actuable keys, operatively coupled to the electrical contacts and/or magnetic transducer, for facilitating user input of data under the control of the smart diskette. The pocket interface unit thereby provides a user interface with the smart diskette.



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## Pocket Interface Unit (PIU) for a smart diskette

BACKGROUND OF THE INVENTION1. Field of The Invention

The present invention relates generally to the field of computer user interfaces, and in particular to a pocket user interface (PIU) device which is adapted to accommodate and/or  
10 interface with a smart diskette.

2. Background Information

A smart diskette is a device having the external shape of, for example, a standard 3½" diskette, and which contains  
15 therein, instead of and/or in addition to a magnetic medium, interface and processing circuitry for providing particular functionality to the device.

The smart diskette circuitry includes an interface for transferring data between other components on the device and  
20 a magnetic head of a standard disk drive. In various forms, the smart-diskette device also includes a microprocessor for controlling the device and performing various tasks, such as

data encryption, and memory, in the form of RAM (random access memory), ROM (read only memory), EEPROM (electronically erasable/programmable read only memory), and/or Flash memory devices, for storing programs and data.

5 U.S. Patent No. 5,159,182, and copending application S.N. 08/420,796 (Atty Docket No. LWBR 0006C1), disclose a smart-diskette insertable element with magnetic interface, processor, power supply and optional display and keypad to be inserted into a standard 3½" floppy disk drive, for example,  
10 of a host computer, i.e., electronic data processing (EDP) equipment, such as a desk-top personal computer (PC) or notebook computer.

An exemplary embodiment of the smart-diskette insertable element disclosed in the above-mentioned patent and  
15 application, has a processor with a built-in memory and an interface designed in such a way that it is possible to exchange data between the element's processor and the EDP equipment's disk drive read/write head. A driver converts signals coming from the element's processor into the required  
20 magnetic form at the interface, and converts signals coming from the external EDP equipment through the interface into the required form for the processor.

A significant advantage of this smart diskette insertable element is that, by virtue of its insertability  
25 into a standard disk drive and interfaceability therewith, it

is possible to carry-out operations with the element's processor, such as encryption and decryption of data or verification of user identity, without requiring a special interface or plug-in board which might be suitable only for a particular computer system.

Another advantageous feature of the smart diskette insertable element is its ability to store additional data and/or programs in on-board memory connected with the element's processor. This considerably increases the potential areas of application for the element.

The smart diskette element disclosed in the above patent and application, may also be equipped with a battery power source supplying power to other electronic components within the element.

The interface of the smart diskette insertable element is designed to allow data to be relayed through it, between the element's processor and the read/write head of the disk drive. One way of achieving this is to place an electromagnetic component, e.g., one or more coils, in the vicinity of the interface which is able to generate magnetic field information equivalent to that generated by the magnetic disk of a standard, e.g., floppy, diskette. In this way the interface is therefore able to simulate the magnetic disk. This property of the interface allows data to be transferred from the element's processor to the

EDP-equipment, e.g., data which enables user identification to be verified, thereby providing security to the EDP equipment. The interface is receives signals coming from the EDP-equipment via the disk drive write head and passes these on to the element's processor. This exchange of data makes a variety of operations possible, as would be recognized by one skilled in the art.

The smart-diskette disclosed in the above patent and application may also be provided with an alpha-numerical display and/or keypad. The keypad and/or display may be in the form of a separate module attached physically and electrically to the smart diskette element so that it is visible even when the smart-diskette is inserted in the disk drive of a computer terminal.

As processor capabilities expand and memory devices with increasing capacity become smaller, the smart diskette takes on the potential for more and more useful applications.

Copending application S.N. 08/211,488 (Atty Docket No. LWBR 0019) discloses a read/write unit with a read/write head and optional electrical contacts, but without the standard disk driving and head moving parts, for use in a desk-top PC or notebook computer to communicate with a smart diskette. By eliminating the drive motor and moving read/write heads, energy otherwise expended by the use of such moving parts is avoided.

## 5

Further, such a read/write unit, since it eliminates bulky drive and head motors, can be made more compact than a standard disk drive, thereby reducing the overall size requirements for the computer in which it is installed.

5       Such a read/write unit in conjunction with a smart diskette operating as a security device can also provide protection from unauthorized use of the computer in which it is installed. Protection against access to the computer, and consequently, any network to which it is attached, is  
10       achieved with the aid of the smart diskette which contains corresponding authorization codes and the like, but which can also be used with standard commercially available, e.g., 3½" drives.

      Since a normal diskette cannot operate with the  
15       read/write unit, an unauthorized user cannot exchange data with the read/write unit. The optional electrical contacts can be used to power the smart diskette components from the computer device in which the read/write unit is installed, and/or to provide another path for data exchange.

20       Possible applications and advantages of such a read/write unit include providing convenient add-on memory without the need of a special interface, such as PCMCIA. In this regard, the read/write unit operates with a smart diskette having on-board memory of several megabytes, for  
25       example.

The read/write unit is particularly useful with notebook and notepad type computers, where energy conservation and weight are very important, since the read/write unit does not have bulky energy consuming moving parts.

5 This read/write unit can be used with conventional EDP devices as well, e.g., desk-top personal computers, to provide additional security, functioning as a 3½" drive which can be used only with smart diskettes, and not with conventional diskettes.

10 Simple data exchanges between conventional 3½" drives and notebooks/notepads equipped with the energy conserving read/write unit are facilitated using smart diskettes. In addition, higher data flow rates than with conventional floppy drive units, e.g., up to several Mbit/sec, are  
15 achievable with this read/write unit.

Pocket calculators and diary devices are known and gaining acceptance with busy executives, for example. However, such devices have numerous limitations and disadvantages. For example, although such devices can  
20 interface with a desk-top computer to download application programs and/or data, for example, or to upload data entered on the pocket device to the desk-top computer, to do so currently requires inconvenient cabling, and/or a special interface unit, e.g., PCMCIA, with associated costs.



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In addition, such pocket devices are generally limited to a single special application, such as a phone directory, or a golf-handicap calculator, and do not provide the range of capabilities of a notebook computer, for example.

5 Although some pocket devices are "programmable," this is often achieved only through the insertion and removal of a limited set of specially made ROM integrated circuit modules available from the manufacturer of the pocket device.

10 Pocket-sized pagers and cellular telephones are also known. However, these respective devices do not generally have the capability of functioning as anything except a pager or telephone, that is, they are generally devices which are dedicated to a single function.

15 Therefore, the fully-equipped, fully-functional executive may be burdened by having to carry around a variety of separate devices, which further disadvantageously cannot readily interface with one another.

#### SUMMARY OF THE INVENTION

20 The present invention pocket interface unit (PIU), in conjunction with a smart diskette having ever increasing capabilities, solves the above-mentioned problems and disadvantages of the current portable devices, and provides new and useful applications for the smart diskette.

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The PIU is a small portable device which provides a smart diskette with various user interfaces. For example, the PIU can provide the smart diskette with a display, buttons, a keypad or keyboard, a mousepad or trackball, etc.

5

The PIU can further provide peripheral interfaces, for example, infrared (IR) communications for a printer, mobile (cellular) telephone and/or wired telephone, short range electro-magnetic receiver for heart-rate monitor, cyclometer, etc.

10

The PIU can itself provide peripheral functions, such as a modem, a mobile (cellular) telephone (data and/or voice), loudspeaker, microphone, etc.

15

One advantageous aspect of the PIU device is that it is configured as a portable pocket-sized device, and allows a smart diskette, which has had data and programs downloaded from a PC via the standard 3½" floppy diskette drive, for example, to be used for various applications away from the PC.

20

A further advantage is that, subsequent to use away from a PC, any new data entered or data modified in the smart diskette via the PIU can be uploaded into almost any PC and used, e.g., stored, processed, communicated, etc., by a PC application program.

25

Advantageously, the PIU device incorporates electrical contacts and/or a read/write unit without energy consuming

moving parts, e.g., disk drive motor and/or head moving motor, providing a way to store data entered remotely, while on an airliner, for example, to a smart diskette, the data being later transferred to a portable or desk-top PC from the smart diskette.

By providing a portable device which incorporates a variety of peripheral functions, the need of an executive to carry multiple devices to be fully-equipped is substantially reduced or eliminated.

Flexibility is enhanced with the PIU and smart diskette combination which advantageously provides a number of pocket size electronic devices, e.g., computers, organizers, games, fitness/sports performance monitors, pagers, etc.

Advantageous connectivity through a simple interconnection via a standard 3½" floppy diskette drive to almost any PC is achieved with the PIU according to the present invention.

Advantageous portability is provided by the design in which the PIU with smart diskette can fit into a coat or shirt pocket to be carried and used practically anywhere.

#### BRIEF DESCRIPTION OF THE DRAWINGS

The above and other features and advantages of the invention will become apparent from the following detailed description taken with the drawings in which:

Fig. 1 shows a first embodiment of a PIU according to the invention, a "mini" PIU, having a slot for physical attachment to a smart diskette, electrical contacts to exchange data with the smart diskette, a mechanism to operate a switch on the smart diskette switch and a battery;

Fig. 2 shows a second embodiment of a PIU of approximate dimensions  $3\frac{1}{2}$ " x  $3\frac{1}{2}$ " x .5" with a slot for physical attachment to a smart diskette, electrical contacts and/or a magnetic transducer to exchange data with the smart diskette, a mechanism to operate a switch on the smart diskette and a battery;

Fig. 3 shows another embodiment of a PIU having similar dimensions and features as the embodiment of Fig. 2, but having a touch-screen or write-on display plus a few buttons replacing the keypad as the means of user input;

Fig. 4 shows another embodiment of a PIU having the approximate dimensions of 6" x 5" x .75" and having a slot for physical attachment to a smart diskette, electrical contacts to exchange data with the smart diskette, a mechanism to operate a smart diskette switch and a battery;

Fig. 5 shows an exemplary embodiment of a smart diskette;

Fig. 6 shows a read/write device having no drive or head motors for use with a smart diskette;

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Fig. 7a shows a smart diskette adapted to receive an IC smart-card;

Fig. 7b shows a cross-section of the smart diskette of Fig. 7a; and

5 Fig. 7c shows an IC smart-card for insertion in the smart diskette of Fig.s 7a and 7b.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The invention will now be described in more detail by example with reference to the embodiments shown in the  
10 Figures. It should be kept in mind that the following described embodiments are only presented by way of example and should not be construed as limiting the inventive concept to any particular physical configuration.

The "mini" PIU 100 according to a first embodiment of  
15 the invention, illustrated in Fig. 1, has, for example, a slot 102 for physical attachment to a smart diskette 103, electrical contacts 104 to exchange data with and/or provide power to the smart diskette 103, a mechanism 105 to operate a  
20 switch 106 on the smart diskette 103 switch, and an optional battery (not shown). The switch 106 powers the smart diskette 103 when it is inserted into a drive or PIU device. The slot 102 may include detentes therein which fit into corresponding recesses in the smart diskette 103, for

example, or other such conventional securing means, for removably securing the smart diskette 103 to the PIU 100.

5 The optional battery (not shown) could be accessed from the underside, i.e., the side opposite the display, through a conventional access panel, for example. The smart diskette 103 itself may contain an internal battery (not shown) as well.

Besides processor, memory and interface circuitry, the smart diskette 103 may also include a real-time clock, and special purpose modules, such as for implementing a cellular 10 telephone, pager, heart-rate monitor, etc. Operating system firmware would be provided on the smart diskette 103, and application program instruction could either be provided in firmware, be down-loadable into RAM memory, or a combination of both. Fig. 5, which will be described below, shows an 15 exemplary smart diskette in more detail.

With the illustrated optional display 108 and buttons 109 a user can read displayed text or graphical data transferred from the smart diskette 103 and, for example, enter selections from a menu presented on the display 108 by 20 actuation of an associated button 109. One of the buttons 109 could advantageously be a manual override power switch to override the switch 106 and de-power the smart diskette 103.

The currently widespread liquid crystal display (LCD) 25 technology provides an effective energy efficient display for

use with the PIU 100. Although not illustrated, the PIU display 108 would incorporate conventional circuitry for driving the display 108 based on data transferred from the smart diskette 103. Alternatively, such display driving circuitry could be incorporated into the display 108 itself, or provided on the smart diskette 103, if practical.

The buttons 109 can be configured as mechanical switches, for example, of various conventional types. Conventional circuitry for detecting/decoding the actuation of a button 109 could be provided on the PIU 100 or alternately the smart diskette 103, as with the display driving circuitry.

Optional further interfaces (not shown) to peripheral devices may be provided on the mini PIU 100, e.g., to a heart-rate monitor or cyclometer, as would be readily apparent to one skilled in the art. These further interfaces may be, for example, infra-red, wired, or wireless links.

For example, a heartbeat detector would transmit pulses of data corresponding to a user's heartbeat via a wireless link to the mini PIU 100 and hence into the smart diskette 103. The smart diskette 103 would store a continuous count of incoming heartbeats and use an on-board real-time clock (not shown) to calculate heart-rate at pre-programmed timing intervals. The user would subsequently insert the smart diskette 103 into a PC's standard 3½" floppy disk drive and

run an application program on the PC which would display the recorded heart-rate data and, for example, show comparisons with previous measurements. Further, with the optional display 108 and buttons 109, a user can have an immediate/continuous read-out of his/her heart rate on the PIU 100.

5 A PIU 200 according to the second embodiment of the invention is illustrated in Fig. 2. The PIU 200 according to this exemplary embodiment would have the approximate dimensions of  $3\frac{1}{2}$ " x  $3\frac{1}{2}$ " x .5", for example, and includes slot 10 202 for physical attachment to a smart diskette 103. Either electrical contacts (104) as in the first embodiment (Fig. 1) and/or a magnetic transducer as in the read/write unit according to related copending application S.N. 08/211,488, is provided in the PIU 200 to exchange data with the smart 15 diskette 103. Also provided on PIU 200, but not shown, is a mechanism to operate smart diskette switch 106, and an optional battery, as in the first embodiment of Fig. 1. An exemplary read/write unit is illustrated in Fig. 6, and will be described in more detail below.

20 Further the illustrated PIU 200 incorporates a keypad 204 provided with, for example, alpha-numerical 206, function 207, and cursor control 208 keys, a display 209, open/closeably connected to the PIU 200 by a hinge 210, for 25 displaying data and/or graphics, with optional touch-screen



15

functions provided through appropriate design and programming, and a piezo-electric beeper, for example (not shown). As with the first embodiment, conventional circuitry for driving the display, keyboard and beeper could be provided on the PIU 200, or alternatively, the smart diskette 103.

Further optional features envisioned could include a conventional transducer or transducers 212, and circuitry (not shown) to operate the PIU 200 as a cellular telephone and/or pager. As with the first embodiment 100, optional interfaces (not shown) to peripheral devices may be provided for on the PIU 200, as would be readily apparent to one skilled in the art.

The second embodiment PIU 200 could be used as follows, for example. A user would insert a smart diskette 103 into a standard 3½" floppy diskette drive of a PC and download, for example, a diary program and data from a PC application into the memory of the smart diskette 103. The smart diskette 103 would then be removed from the PC and inserted into the PIU 200 according to the second embodiment, which may be carried around easily and transported anywhere in the user's coat or shirt pocket. The PIU 200 can then be used to display on display 209 the diary, and update it via the keypad 204 or touch-screen 209 no matter where the user is located, for example, on an airliner or train, or in a restroom. The

optional real-time clock inside the smart diskette 103 can produce an audible signal through the PIU piezo-electric beeper (not shown) to warn the user of appointments, etc. thereby functioning as an alarm clock.

5       The next exemplary embodiment illustrated in Fig. 3 is a PIU 300 with similar dimensions, i.e., sized to fit easily in a coat or shirt pocket, and features as the embodiment (200) of Fig. 2. The PIU 300 has a slot 302 for accommodating a smart diskette 103, a touch-screen or write-on display 303,  
10       and a few buttons 304, instead of the keypad 204 of the second embodiment (200) for user input. An open/closeable cover 305 to protect the display 303 is connected to the main body of the PIU 300 by hinge 306, for example.

15       Further options which could be included in the embodiment of Fig. 3 would be generally the same as for the embodiment (200) of Fig. 2, that is, conventional transducers and circuitry to operate as a cellular telephone and/or pager, optional interfaces to peripheral devices, etc., as would be readily apparent to one skilled in the art.

20       Fig. 4 shows another embodiment of a PIU 400 having, for example, the approximate dimensions of 6" x 5" x .75", with a slot 402 for physical attachment to a smart diskette 103, electrical contacts and/or a magnetic transducer (not shown) as in the previously described embodiments to exchange data  
25       with the smart diskette 103, a mechanism (not shown) to

17

operate a smart diskette switch 106, and an optional battery.

This exemplary illustrated embodiment has a small-sized computer "qwerty" keyboard 404 and a relatively large display 405 open/closeably attached by hinge 406 to the PIU body.

5 Also illustrated is an exemplary location of an optional microphone 408 and micro-camera 410. Associated conventional electronic circuitry (not illustrated) for these optional devices 408 and 410 would be located either in the PIU 406 or the smart diskette 103.

10 Further options for this exemplary embodiment include those mentioned above for the other embodiments, i.e., a conventional transducer or transducers (212), and circuitry to operate as a cellular telephone and/or pager, optional interfaces to peripheral devices, etc., as would be readily  
15 apparent to one skilled in the art.

Fig. 5 illustrates an exemplary smart diskette 103 for use with a PIU according to an embodiment of the present invention. A magnetic transducer 510 is electrically coupled to control/interface block 511 to accomplish data transfers  
20 to and from a corresponding read/write head in the PIU. The control/interface block 511 is further coupled to processor block 512. Memory block 513, which represent RAM, ROM, EEPROM, Flash memory, etc., is coupled to the processor block 513. Battery 514 supplies power via regulator 516 to the  
25 various components. Alternatively, power may be supplied

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